



3. Planning Approach

DNR's approach to the guidelines in this Lynx Management Plan incorporates three key elements:

- **Assumptions** – A basis for developing guidelines in the absence of adequate or definitive scientific information on lynx ecology.
- **Different spatial scales** – A structure to capture and integrate the landscape with stand level features of lynx habitat.
- **Desired future landscape conditions** – A description of the intended on-the-ground results.

3.1 Assumptions

The urgency of conservation efforts for threatened and endangered species often forces biologists and land managers to make decisions without statistically rigorous data to guide them. In some cases an educated guess becomes an accepted policy before it is tested. This may not only prevent important relationships from being recognized in the data collected, but it may also be difficult to change the policy once it has already been incorporated into management plans. With most endangered species, there is little time for misdirection. For these reasons, management plans should take an experimental approach with careful planned actions centered on hypotheses that can be modified, tested, and refined (Walters 1986, Murphy and Noon 1992). Biologists aware of the uncertainties involved are responsible for reminding interested parties of the hypothetical nature of their endeavors and clearly identify their assumptions.

Because information on lynx habitat relationships, forage ecology, and population demography in the southern boreal forests is limited, the strategies within this document are extensions of current hypotheses in lynx ecology. The information on lynx ecology used to develop the management guidelines in this plan is provided below each guideline. The intention is to help biologists and land managers to more easily adapt in the future to scenarios overlooked by the plan and revise strategies as more is learned about the habitat associations and status of lynx.

General considerations for the conservation of lynx based on Thomas et al. (1990) conservation strategy for the northern spotted owl, as presented by Weaver (1993), have been adopted for this plan. It is presumed that a plan based on these assumptions will contribute to the continued persistence of lynx in Washington:

- A. Species that are well-distributed across their historic range are more persistent than species confined to small portions of their range.

-
- B. Population persistence increases with the number and size of sub-populations and the size of habitat blocks.
 - C. Blocks of contiguous habitat in close proximity promote a higher probability of persistence than dispersed blocks of fragmented habitat.
 - D. Population persistence increases when blocks of habitat are interconnected through linkages of suitable habitat
 - E. The persistence of exploited populations increases with a well-distributed network of refuges or safety nets.

3.2 Planning Scales

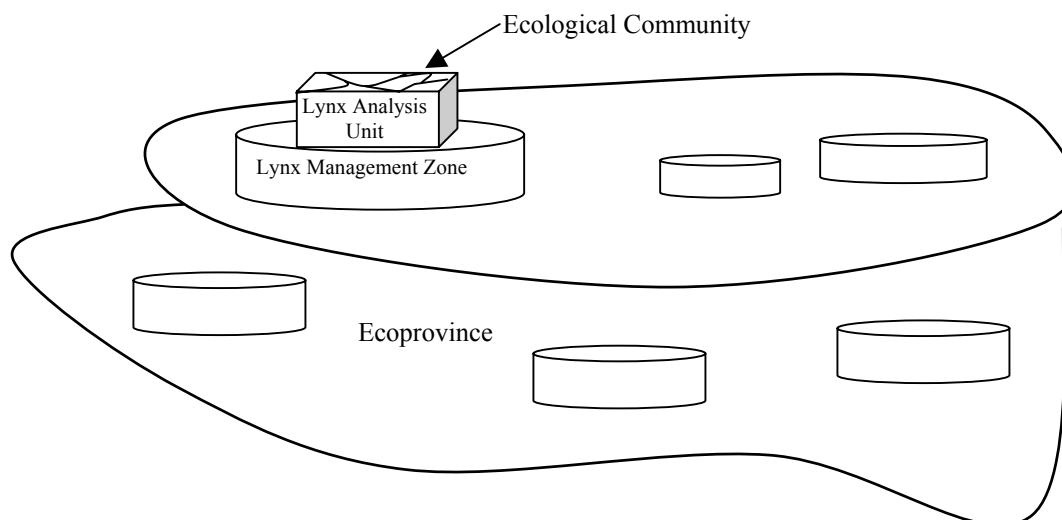
DNR's lynx conservation strategy has a multi-leveled structure that reflects the complexity of managing habitat for large terrestrial carnivores. An individual lynx has an extensive home range, makes extensive movements, and requires a mosaic of different habitats to meet its needs. Persistence of viable lynx populations requires an adequate amount and connectivity between the habitat types over large landscapes. Hence, lynx habitat planning requires land managers to use a multi-scaled approach in order to facilitate the ecological attributes of lynx habitat in Washington, and the biological needs of the individual animal as well as the species in general. Managers have to consider not only the habitat within their jurisdiction, but also the larger context in which their land is situated. For DNR this approach includes coordination of lynx habitat management efforts with other state and federal agencies and British Columbia.

DNR's lynx habitat management strategy applies four nested spatial scales. In order from large to small, they are:

- Ecoprovinces/Ecodivisions,
- Lynx Management Zones,
- Lynx Analysis Units, and
- Ecological Communities

An example of a relatively small scale is the lynx home ranges, as small as 3.8 square miles (9.9 km²), recorded in an untrapped area in the Yukon (Slough and Mowat 1996). In the same area, 17 lynx traveled >62.2 miles (100 km), with 11 recorded at distances of 311-684 miles (500-1,100 km) from their original collaring locations, reflecting an immense scale of potential habitat use. Figure 4 and Table 3.1 show the hierarchy and relationship of the planning scales. Each scale is described in more detail with its associated guidelines in Chapter 4.

Figure 4. Relationship of lynx habitat planning scales



**Table 3.1
Hierarchy of spatial scales in DNR's Lynx Habitat Management Plan**

	S C A L E			
	Ecoprovince and Ecodivision	Lynx Management Zone (LMZ)	Lynx Analysis Unit (LAU)	Ecological Community
Source	Demarchi 1992 Demarchi and USFS 1994	WDW 1993 Stinson 2001	WDFW GIS data (2001)	DNR's Forest Resource Inventory (FRIS)
Size		6.6-2,885 mi ² (10.6 – 4,642 km ²)	6 -130 mi ² (9.7 –209.2 km ²)	20 - 400 acres (8 – 162 ha)
Description	Defined by macro- climatic processes and habitat types	Estimated from sightings, trapping records, habitat types, and elevation	Delineated by Watershed Administrative Unit (WAU) and ownership boundaries	Individual stands of similar vegetation, age, and structure

Management ratios and guidelines in this plan focus on the Lynx Analysis Unit (LAU) level, with the small-scaled goal of maintaining the integrity of habitat regularly used by individual lynx or family groups. With an average size of 43 square miles (Stinson 2001) LAUs are generally large enough to encompass the median home ranges reported for lynx in northcentral Washington (Table 3.2). However, the LAU is simply a spatial unit chosen by DNR to monitor habitat and lynx presence on the landscape through time. Lynx will undoubtedly shift their habitat use as forests change, without regard to LAU boundaries. The LAUs are encompassed in two higher spatial scales (Ecodivision/Ecoprovince and Lynx Management Zones) to incorporate habitat connectivity from a broader perspective.

Table 3.2
Relative sizes of LAUs and lynx home ranges in Washington

	Number	Median	Range
Lynx Analysis Unit	29 (containing DNR-managed land)	31.6 mi ² (82 km ²)	6.6 - 79.7 mi ² (17 - 206 km ²)
Female Home Range*	9	14 mi ² (36 km ²)	3.2 - 33.9 mi ² (8.3 - 87.8 km ²)
Male Home Range*	13	21 mi ² (54 km ²)	9.6 - 38.2 mi ² (14.2-99.0 km ²)

*minimum convex polygon method (Brittell et al. 1989, Koehler 1990a)

3.3 Desired Future Landscape Condition

The following description represents the desired future condition for DNR-managed lands within lynx range (Figure 2). This vision is the expected outcome of the plan's quantitative habitat ratios and guidelines:

- A balance of stands in different structural stages minimizes the probability of long-term adverse effects to lynx, realistically reflects the land's potential as lynx habitat, integrates other forest resource concerns, and reflects the current understanding of lynx habitat requirements:
 - 1) forage habitat is interspersed throughout the landscape and connected to other forage habitat via other forested stands,
 - 2) denning areas are adjacent to, within, or near forage habitat, connected by other forested stands,
 - 3) human-related disturbance is managed at acceptable levels,
 - 4) forested connections to adjacent lynx habitat, including habitat in British Columbia, are maintained.
- Harvest unit plans that result in temporary non-lynx habitat will avoid the probability of extirpating lynx by:
 - 1) dispersing harvest units in relation to existing lynx habitat elements, and
 - 2) ensuring adequate regeneration within harvest units.

MODELING

By modeling the results of proposed guidelines, DNR can test how likely the guidelines are to create the desired future landscape conditions. Given the time it takes for stands to grow into lynx habitat, long-term planning is key to ensuring an appropriate mosaic of habitats through time and for optimizing timber sale planning options.

In the 1996 Lynx Plan, the long-term feasibility of LAU-level lynx management guidelines was tested using modeled habitat predictions. These predictions were based on models of stand growth using the North Idaho Variant of the Forest Vegetation Simulator (FVS). The projections provided a reasonable estimate of stand development, but lacked specific data on assumed relationships that may influence habitat development on DNR-managed lands.

The modeling was not updated for this revision of the plan, but the habitat changes at the landscape level for both the Loomis State Forest and Little Pend Oreille block from 1996 to 2004 are reported in Appendix 1, Section 4. As staffing is available, the modeling will be completed to incorporate the change in planning and ownership on the Loomis State Forest – transfer of areas to conservation status, watershed analyses, and Loomis Landscape Plan update. In the Little Pend Oreille block, the new inventory data will be used to update the distribution of the vegetation zones and the management regime by vegetation zone. The goal of the modeling will be to reproduce figures 33 and 34 of the 1996 Lynx Plan – projected habitat components in the two blocks by decade.

